VERATRONE IN THE TREATMENT OF ECLAMPSIA.

Thesis for the Degree of M.D. 1914.

by

THOMAS Clark RITCHIE, B.Sc., M.B., Ch.B.

It is not so long since authorities were agreed that eclampsia was due to an acute nephritis, that we knew all there was to know about it, and that no further progress either in prophylaxis or treatment would ever be made.

Contrast with this a statement made by Dr Whitridge Williams a few years ago that we were now prepared to admit that we knew nothing about the causation of eclampsia and were at last in a position to learn, a statement which is equally true to-day.

We believe now that eclampsia is a profound toxic disturbance of the whole system somehow dependent on the existence of pregnancy, and as this toxic change arises from changes produced in the body itself, and not as the result of substances introduced from without, it is an "autointoxication".

The disturbances are produced by products of metabolism that have been formed within the tissues of the body. The term metabolism must be understood in its widest sense, and to indicate any form of chemical or biochemical cell-activity - normal or otherwise. Eclampsia is intimately associated with abnormal cell-activity. During the course of metabolism innumerable organic compounds are formed, some of which are of a more or less poisonous nature. As long as the body is in/

in a normal condition, and as long as the compounds themselves are not too abnormal, either in quantity or quality, no harmful accumulation results. This is accomplished in the following ways:-

(1) Elimination from the body in the urine, sweat, faeces, etc.

(2) Combination with other substances into harmless or relatively harmless substances.

(3) Chemical alterations into compounds that are non-toxic or relatively innocuous.

A harmful accumulation of metabolic products or an intoxication may result from any of the following conditions (Wells: Chem. Pathology):-

(1) Failure of elimination, because of abnormal conditions in the eliminating organs; e.g., uraemia.

(2) Failure of neutralization by chemical combination, presumably due to abnormalities in the organs or tissues through whose activities the neutralization is normally accomplished; e.g., diseases of the liver.

(3) Failure of the chemical transformation of the metabolic products: this may result either from abnormalities in the functionating tissues or through a checking of the normal steps of metabolism by the failure of the elimination of the end-products.

(4) Excessive formation of toxic chemical substances; e.g., autolytic changes in an organ, such as the liver, or the intoxication following superfacial burns.

Eclampsia does not fall into any one of the above groups, but so complex and far-reaching are the anatomical and chemical changes that, according to Eardley Holland, it may be said to present a combination of all four.

But though the majority are convinced that eclampsia/

eclampsia is an autointoxication, no observer has yet been able to prove what the primary cause of the condition is. Our ignorance of the pathology of the disease is so great that naturally from time to time widely divergent theories as to the etiology have been brought forward - theories, many of which are interesting, all of which may possibly be sometimes true, but in regard to none of which have we any absolute knowledge.

All then that we can fairly claim is that eclampsia is due to an autointoxication in some way dependent on pregnancy. Though we do not know the nature or origin of the "eclamptic toxin", or what is more probably correct - the "eclmaptic toxins", we can recognise the physical lesions which they produce. We can also recognise the symptoms which they call forth, and any treatment to be intelligent must take cognizance of both of these factors, but owing to the poverty of our knowledge of the pathology of the disease the treatment must be based on speculation and experience rather than on scientific grounds.

In order to treat any condition intelligently, it is necessary to have a clear conception of what the treatment is designed to accomplish. In eclampsia we have a morbid condition to contend with which is in some way dependent on the pregnant state, which usually gives marked premonitory warnings, as albuminuria and diminution in the amount of urine excreted, headache, muscae volitantes and dimness of vision, vomiting etc., and/

and which is caused by some substance or substances circulating in the blood which produce marked inflammatory changes in the various internal organs. This toxaemia is characterized by a high blood pressure which throws undue strain on any weakened vessels and on the heart which is probably always weakened by the degenerative action of the toxins. The disease is moreover characterized in its more severe type by convulsive attacks during which the strain on the arteries and heart is greatly increased, thus markedly increasing the tendency to rupture of the cerebral vessels on the one hand, or acute cardiac dilatation on the other, and one or other of these conditions is the ultimate cause of death in a large number of patients. Additional dangers which may be caused by the fits and which account for a certain proportion of deaths are pulmonary complications as aspiration pneumonia and oedema of the lungs. Furthermore a certain number of patients die from the damage done directly by the toxins, a not uncommon result in cases in which adequate treatment is long deferred.

The treatment of such a condition must be directed to stopping the absorption of the toxins, to securing their elimination and to neutralizing their effects meanwhile, and must be divided into (a) prophylaxis and (b) the treatment of the disease.

(a) Prophylaxis. I do not propose to enter into the discussion/

discussion of the prophylactic treatment. All authorities are agreed as to the tremendous importance of such treatment, and there is also general agreement as to the best method for carrying it out. Within the last few years the duty of the practitioner to his patients during pregnancy has been emphasized, and it has been made clear how much suffering and ill-health can be prevented by proper and careful treatment of the expectant mother. This is especially the case in eclampsia. It is probable that very few threatening cases would ever develop into the severe form of the disease were careful supervision of the mother's health carried out from the very commencement of pregnancy. It is to be hoped that the next few years will see a still wider employment of efficient prophylactic treatment, and consequently a great diminution in the ravages of this dire disease.

(b) Treatment of the Disease. When however we come to consider the treatment of the disease itself, after the fits have commenced, we find ourselves in the midst of a bewildering maze of divergent and even conflicting opinions. It is agreed that the purpose of treatment is threefold: (1) to control the convulsions; (2) to eliminate the toxins; (3) to terminate labour. The chief divergence is as to the relative importance of these indications, whilst there are further differences as to the best way of achieving each.

We shall consider each of these three lines of treatment/

treatment separately, but for convenience sake we shall take them in the inverse order.

TO TERMINATE LABOUR.

This has probably led to more argument than either of the other two methods along which treatment is directed.

Were we to accept the view that the primary cause of eclampsia is to be found in the contents of the uterus, and at the same time admit that the presence of the foetus in utero undoubtedly acts as a source of reflex irritation, then the emptying of the uterus seems a rational mode of treatment. It is, at any rate, a method of treatment which at the present day is practised by many obstetricians of note whose views must carry great weight. Thus, Bumm suggests that the rapid delivery of every patient on the occurrence of the first fit would be followed by a lowering of the maternal mortality to 5 per cent. The cases collected by Zweifel show a mortality of 28.5 per cent under expectant and one of only 11.2 per cent under active obstetric treatment.

Peterson reports a maternal mortality of 15.9 per cent in 615 cases treated by prompt delivery, but a mortality of 28.9 per cent in 390 cases treated expectantly. When the uterus was emptied immediately after the first convulsion, the mortality was still lower.

He/

He therefore advises the operative procedure which will empty the uterus in quickest time, with least trauma and shock to the mother, i.e. Caesarian Section.

Hermann, on the other hand, adduces abundant evidence in the other direction. He has collected the statistics of a large number of writers. In all there were 1642 cases; fits ceased after delivery in 813 cases, or 49.5 per cent; and continued after delivery in 829 cases, or 50.5 per cent. The mortality in cases where natural delivery occurred was very much smaller than that in which delivery was accelerated. He makes the following inference:- "I submit that immediate delivery is not the first thing in treatment; that if it is beneficial, the benefit is of the most trifling kind, so small as to be doubtful. The practice is one based upon theory, not upon experience. The advantage is so small that if hurried delivery were indiscriminately practised by all who attend labour, in all circumstances, the mortality arising from operative delivery would soon overbalance the trifling and doubtful benefit of emptying the uterus. I therefore think that the teaching that to empty the uterus quickly is the first thing in treatment is bad, because likely to lead to bad results".

One could quote many other authorities whose statements are equally strong in favour of one view or the other.

But though there is so much controversy as to the correct/

correct obstetric treatment before labour has set in or during the first stage, there is almost universal agreement that once the second stage has been reached, labour should be assisted as much as possible by application of forceps under an anaesthetic.

Delivery by forceps after the second stage has been entered causes little shock, and prevents the long process of bearing down which cannot but be harmful to a patient who is already worn out with eclamptic convulsions, and in whom the blood-pressure is already abnormally high.

But the obstetric treatment in eclampsia promises long to remain a debatable question, and the subject is too large to discuss here.

In Glasgow, where I gained the little experience I have in eclampsia, the expectant treatment was the rule, the "chiefs" of the Maternity Hospital having given up the use of forcible delivery, as they believe that the shock accompanying the drastic measures which are frequently necessary to procure rapid delivery is often more harmful to the patient than the eclampsia itself. They however make it a general rule to assist labour during the second stage, unless the fits have been successfully controlled and the emunctory organs have resumed their work before that stage has been reached.

TO ELIMINATE THE TOXINS.

There are three main channels through which a poison may be eliminated from the blood - viz., the skin, the bowels, and the kidneys. The importance of keeping these three channels open has long been recognized.

One may succeed in producing diaphoresis by simply covering the patient well with blankets and surrounding her with hot tins. If this fails one may resort to the hot-pack or vapour-bath. In the Glasgow Royal Maternity and Women's Hospital there are in the labour-ward special beds for the treatment of eclamptic patients and those suffering from shock or haemorrhage. Underneath the spring mattress a tin can be inserted. This tin extends the whole length and breadth of the bed, it can be kept filled with hot water, and can be raised or lowered under the mattress as required. A large amount of heat is radiated directly to the patient and these tins are found to be invaluable in the treatment of such cases. During the six months of last winter when I was House Surgeon in the hospital, we never failed to obtain a good diaphoretic action and in only one of the 42 cases of eclampsia that were admitted during that period did we have to resort to the hot-pack.

Such a contrivance cannot of course be obtained in a private house but there are, I think, few cases in which diaphoresis cannot be induced by covering the patient well with hot blankets and surrounding her with hot tins or bottles.

The hot-pack is excellent as a rule but sometimes

is too depressant in its action.

Pilocarpine will cause profuse diaphoresis and it has been and still is sometimes used, but it is a dangerous drug to use on account of its depressing action, and because of the liability of increasing any oedema of the lungs which may be present.

To get the bowels to act is not always easy. The lower bowel should in all cases be at once thoroughly emptied by enemata.

The stomach frequently contains undigested matter which has been lying in it for some little time, is undergoing fermentation and acting as a source of intoxication. I found this so frequently that I always made it a routine practice to wash out the stomach. When the wash-water returns clear, one should run in at least two to four ounces of Epsom salts. This was usually found to be the best cathartic, though sometimes when vomiting is severe, compound jalap powder is retained better. Croton oil is recommended by many because of the ease with which it can be given to comatose patients, but it is not so certain in its action. Other cathartics can easily be given to comatose patients by means of the stomach-tube.

The kidneys are the organs of excretion which are most at fault in eclampsia, and give one most difficulty in treatment. It is useless to administer the ordinary diuretics. The patient as a rule is unconscious and cannot swallow, and even if we introduce the drugs directly/

directly into the stomach by means of a tube, they will probably not be absorbed, and, even if absorption were normal, there is not time to wait till they act. Probably the surest means of obtaining diuresis is that suggested by Jardine. With the idea of flushing the kidneys he gives large infusions of normal saline solution, combined with sodium acetate in dram doses to the pint. The infusion also acts beneficially by diluting the poison and stimulating the system. The saline at a temperature of 100°F. may be given into any part of the body where there is loose cellular tissue. Under the breasts is the most suitable situation before delivery, but after delivery the tissues of the lax abdominal wall may be used.

The infusion may be repeated every few hours, if the patient's condition does not improve.

The beneficial influence of saline solution is well illustrated by the fact that Dr Jardine has reduced the mortality in the Glasgow Maternity Hospital from 47 per cent to 17 per cent since he introduced this measure.

As soon as the patient is able to swallow, she should be given as large an amount of distilled water and imperial drink (i.e. Acid Potassium Tartrate gr. XXX: Lemon Syrup ℥1: Distilled Water up to ℥1) as she can take. Milk, even diluted, and all other foods should not be given until the patient has entirely regained consciousness and the fits have ceased for at least 24 hours, as any food is so liable to remain in/

in the stomach undigested, to undergo fermentation, and to act as a further source of intoxication.

Under the means that may be employed to eliminate the toxins, we must also include venesection. From 10 to 20 oz. of blood may be withdrawn and it is wise to follow it up in all cases with saline infusion direct into the vein. By this means the total amount of toxins in the body is reduced, and at the same time diluted by the addition of the saline. But probably the chief benefits of venesection are the reduction in the blood pressure that takes place and the relief to the right heart upon which frequently a great strain falls as evidenced by marked venous congestion and cyonosis. But venesection should only be performed when the patient is full-blooded, with a strong bounding pulse.

In all cases haemorrhage may be encouraged during the third stage of labour.

Though there are many who employ venesection as a routine and consider it to be invaluable, there are I think few cases in which it is necessary. Almost certainly its chief benefit is to lower the blood-pressure and this is somewhat nullified by the subsequent injection of saline. We have, as I hope to be able to point out, a much surer and better means of lowering the blood-pressure in "veratrone"

MEASURES CALCULATED TO ARREST OR CONTROL THE FIT.

Immediate treatment of the seizure. During the fit nothing can be done except to prevent the patient from injuring herself. A rubber gag, a cork, or a handkerchief folded in several thicknesses should be placed between the teeth over the tongue, and held in position until the clonic contractions have ceased. The patient should be turned upon her side to allow the salivary secretions, produced in excess during the convulsions, to escape from the mouth, and to prevent their finding their way into the lower air-passages while the patient's reflexes are absent.

To control the recurrence of the convulsions. This is usually accomplished by the administration of anaesthetic or sedative drugs which directly influence the central nervous system.

Chloroform has long been used for this purpose and is still greatly favoured by many authorities. It is however a most dangerous drug in all cases of intoxication and where the liver is affected on account of its toxic properties, and should therefore never be used in eclampsia except when operative interference is intended, and even then ether is the safer anaesthetic.

Chloral hydrate and Potassium bromide given frequently in combination are greatly favoured by some. In the experience of many, however, they are not very effective/

effective in controlling the fits; though in mild cases, where the patient is very restless, they may often prove useful.

Morphia is probably the drug that has been used to a larger extent than any other. The opinions of authorities as to its efficacy vary very greatly; and the statistics showing the result of treatment show no uniformity, but rather are contradictory.

Hastings Tweedie gives ½ gr. morphine hypodermically, and repeats in ¼ gr. doses up to 2 gr. in the 24 hours. He reports its use in 74 cases with the remarkably low mortality of 8 per cent.

Comyns Berkeley claims for morphia that it inhibits metabolism and so stops the formation of poisons, whilst large doses remove the state of spasm in the renal arteries and so favour urinary secretion.

Hirst, Haultain, Jardine and others are equally convinced that morphia lessens the excretion of urine and antagonizes the whole eliminative treatment, and that there is danger of fatal poisoning from the large doses required, in view of the inactivity of the kidneys.

I agree with the latter and think that although it certainly seems to be very efficacious in controlling the fits, it certainly does antagonize elimination, and that it should never be given where there is almost complete anuria.

Omnopon naturally comes under the same category as morphia, but has, in my experience, this advantage, that/

that instead of inhibiting diaphoresis, it seems rather to encourage it.

Many other measures have been greatly praised by some, and have been apparently successful in a few cases, but have not stood the test of time. Such are lumbar Puncture, the injection of Magnesium Sulphate into the cerebro-spinal canal, thyroid extract, nitrites, etc. These I do not intend to discuss at all.

For many years veratrum viride has been used by some obstetricians, and as a means for controlling the fits has always been very highly praised by many physicians especially in America.

It is the treatment of eclampsia by means of this drug that I wish to refer to and study more fully.

VERATRUM VIRIDE.

Its Pharmacology. Among the first to make known the physiological and pharmacological properties of veratrum viride were Osgood and Bullock in papers published in the American Journal of Medical Sciences in 1835 and 1836.

The next writer was Dr W. C. Norwood in the Charleston Medical Journal and Review. In America his name is still associated with the tincture.

Then followed a numerous series of observations calculated to show the efficacy of the drug, to study the mechanism of its action and to decide the rules of its administration. There was however so great diversity of opinion that in March 1858 a committee consisting of Dr Ephraim Cutler, Dr Newman Richard, and Dr Wm. Dugalls was appointed in the United States of America to investigate and report upon the medicinal properties of veratrum viride. In October of the same year they published the following conclusions:-

"As an arterial sedative it is more certain than any other medicine. It reduces the number of beats of the pulse with remarkable constancy and uniformity. In some cases, from individual idiosyncrasy, larger and more frequent doses are needed than in the majority. Its use for this purpose is perfectly safe, as, when carried too far, nausea or diaphoresis, or both, give timely warning that the dose must be diminished or its use/

use suspended. It seldom or never purges and hence its action is quite unlike that of veratrum album. It is an arterial sedative of great power".

The pharmaceutical chemists of that time held that Veratrum Viride contained an alkaloid which they could not distinguish from veratrin. The latter is an alkaloid derived from Veratrum Sebadilla. It occurs only in traces in suitable preparations of Veratrum Viride and its effects do not appear even in cases of poisoning by the latter drug.

The pharmacology of the drug was not fully and accurately worked out till H. C. Wood in 1870 published his study on the alkaloids jervine and veratroidine which form the active principles of the drug.

As Wood is still the authority on the subject I take the following account from his "Therapeutics: Its Principles and Practice".

"The rhizome and roots of Veratrum viride, a coarse perennial herbal plant, indigenous to the Northern United States. It is a large tapering rhizone, an inch or two in length, less than an inch in thickness at the base, and having a bitter acrid taste.

"The nature of the active principle of Veratrum Viride has been the subject of much investigation and discussion by chemists, the results of which are given in full in the 18th edition of the U.S. Dispensatory. Suffice it for the present to state that the later researches seem to show that in veratrum viride there exist/

exist six alkaloids instead of two as formerly believed. The most important of these alkaloids are jervine and rubijervine; the others, pseudojervine, cevadine, veratrine, and veratralbine - are present only in very minute quantities; rubijervine is the veratroidine of Charles Bullock.

"Local Action. Veratrum viride is not actively irritant, although there is reason for believing that the vomiting which it causes is partly due to some local influence exerted by it upon the stomach. It yields its active principles very rapidly to absorption; its effects become apparent in 15 to 25 minutes after its ingestion. Concerning its elimination we have no practical knowledge, but its active principle probably escapes through the urine.

"General Action. The only effect perceptible in man after the small physiological dose of veratrum viride is a reduction of the force of the pulse. If the dose has been a little larger the pulse frequently also falls very markedly, it may be to 40 or even 30 per minute. The volume of the pulse rises, though the force of it is very slight. The final reduction of the pulse-rate is accompanied by nausea, and at last by vomiting, which becomes after a very large dose exceedingly severe. By exercise this slow, large, soft pulse may be converted into a rapid, very feeble and small pulse. Under any circumstances the rapid pulse developes sooner or later if the dose has been sufficient,/

sufficient, and is accompanied by intense muscular weakness and great sweating. Finally, there are a running, almost imperceptible pulse; a cold, clammy skin; intense nausea, and incessent attempts at vomiting, or retching, or hiccough; absolute muscular prostration; faintness, vertigo; loss of vision; and semi-unconsciousness. Various observers also speak of an excruciating praecordial pain; but this we have not seen. The intestines are usually not disturbed, but severe purging has been noted.

"In 1870 H.C. Wood made an elaborate study of the alkaloids jervine and veratroidine (rubijervine) supplied to him by Charles Bullock, with results which are here epitomized.

"In the dog and rabbit jervine caused sluggishness, with progressive muscular weakness and diminution of the reflexes; with, after a time, violent general tremors ending in convulsions in which, although the movements were violent, there was evident loss of power. The pupils were not affected; there was no purging or vomiting, though always profuse salivation. Locally, jervine was not irritant. Consciousness was preserved almost to the last, and death occurred from asphyxia. Physiological studies showed that the convulsions were of cerebral origin, but were probably due to disturbances of circulation in the brain, the brain not being otherwise affected; also that the loss of muscular power was due to spinal depression, the function of the/

the peripheral nerves and muscles not being interfered with.

"Upon the respiratory centres jervine acted as a direct depressant, but its influence upon the circulation was not at all subordinate to its action upon the respiration, and when final arrest of respiration occurred the circulatory forces were almost abolished. The circulatory phenomena were primary slowing of the pulse, with later rapid pulse, and a progressive falling of the arterial pressure from the beginning to the end. The slowing of the pulse was not due to any effect on the pneumogastric nerves, the jervine acting as usual after section of these nerves, and galvanization of the nerves producing the ordinary results in the deeply poisoned animal. The slowing of the pulse was due to a direct influence upon the heart-muscles or its ganglia, which is depressed by any dose of the poison. As however neither asphyxia nor galvanization of a sensory nerve produces rise of pressure in the poisoned animal, it is evident that jervine depresses the vaso-motor centres.

"The physiological action of jervine may be summed up as that of a powerful depressant of the heart and of the vasomotor centres, which acts also upon the motor side of the spinal cord and upon the respiratory centres, but has little other influence upon the organism.

"Veratroidine was found to be more irritant than jervine,/

jervine, producing usually vomiting and sometimes purging, but not causing such severe convulsions as did jervine, death taking place from central asphyxia. In its relations with the cerebrum, the spinal cord, the peripheral nerves, and the muscles veratroidine practically acted like jervine. The circulatory action of veratroidine was entirely subordinate to its influence on the respiration, so that when given in toxic dose hypodermically it caused an enormous rise of the arterial pressure, due to the rapidly induced centric asphyxia, as was shown by the fact that it did not occur when artificial respiration was maintained. After section of the par vagum, veratroidine was powerless to reduce the pulse-rate, and division of the par vagum in the posioned animal was followed by an enormous rise in the pulse-rate. Further, it was found possible to cause by the intravenous administration of a certain dose of veratroidine, artificial respiration being maintained, a diastolic arrest of the heart's action, which was at once relieved by division of the par vagum or by a second injection of the poison; so that an animal apparently dead could be restored to life by vagal section or by giving more of the poison. As it was proved that the large dose of veratroidine paralyzes the peripheral vagi, it is evident that the diastolic arrest just spoken of was due to excessive cardiac inhibition, and that its removal by section with the knife, or with the drug, allowed the heart to go on.

During/

"During the period of low pressure galvanization of the sensitive nerve, or asphyxia, produced no immediate rise in the arterial pressure, conclusive proof that the vaso-motor centres were not affected.

"These effects upon the circulation were obtained only when artificial respiration was maintained, the effect of the drug upon the respiratory centre being so intense that when the animal is left to itself death occurs before any direct influence has been exerted upon the circulation.

"Veratroidine is thus a powerful respiratory poison, lessening at first the frequency of the cardiac beat by stimulating the pneumogastrics, but soon losing all power over the heart, owing to the powerful influences of the asphyxia produced by it.

"The action of veratrum viride is the result of the combined influence of its alkaloids, and as the relative proportions of these alkaloids differ in different rhizomes, so in the finer details of its physiological action one specimen of veratrum viride differs from another. For all practical purposes, however, its influence is uniform, and may be summed up as follows:-

"Summary. Veratrum viride has no distinct local action, yields readily its active principles to absorption and probably to elimination, though concerning its fate in the system we have no definite information. The free sweating which accompanies its marked action may/

may be simply the result of a profound arterial depression, there being no proof that the drug exerts a specific influence upon the glands of the skin. Similarly the excessive secretion of bile which it sometimes induces may be a secondary result due to the severe vomiting.

"By the depressing action of jervine upon the heart-muscle and upon the vaso-motor centres, veratrum viride lowers the arterial pressure, in the beginning slowing the pulse by a direct influence of jervine upon the heart-muscle, and by the stimulating action of veratroidine upon the pneumogastric nerve, but later increasing the rapidity of the pulse by paralyzing the pneumogastric nerve (veratroidine), and probably also by some action on the heart-muscle (jervine). Chiefly, if not solely, through a centric influence, it causes violent vomiting, and in rare cases, when there is in it an excess of the veratroidine, purging. On the motor side of the spinal cord it acts as a powerful depressant, but is without influence upon the cerebrum, the motor nerves, and the muscles. Probably on account of the vaso-motor paralysis which it produces favouring an increase of heat-dissipation, it decidedly lowers animal temperature, a fall of as much as four or even more degrees sometimes occurring in the poisoned lower animals before death.

"Toxicology. Although veratrum viride is a remedy of great power, capable of producing the most alarming/

alarming symptoms, yet it is the safest of the cardiac depressants. Overdoses of it provoke vomiting so soon and so certainly that it is somewhat doubtful whether a robust adult could be killed by a single dose of any of its official preparations, especially if prompt and judicious treatment were afforded".

-----"In cases of poisoning, vomiting should be encouraged by large draughts of warm water until the stomach is well washed out. Then the patient should be forced to lie flat upon the back, with the head lower than the feet, and the efforts of vomiting should be restrained. If they cannot be checked, and if the prostration be severe, on no account should the patient be allowed to rise up, but must be made to vomit into a towel. A full dose of laudanum should be given by the rectum, and brandy or whiskey be administered by the mouth. Tincture of digitalis and strychnine should be given hypodermically. We have noticed that spirits will sometimes be retained only when given undiluted, and in such form will quiet the stomach at once. If the stomach refuses alcohol in any shape, the rectum should be made use of. Ammonia may be employed as an adjuvant to alcohol. External heat is important, and mild flagellations, rubbing with coarse towels, sinapisms, etc., may be used to keep up the external capillary circulation".

Contraindications to its use are cardiac weakness and general adynamia.

Its Application to Eclampsia. From the foregoing description of the drug's action, we can see how it may be of valuable service in the treatment of eclampsia, especially in the controlling and prevention of the convulsive fits. For in it we have combined the action of a cardiac vaso-motor depressant and of a spinal sedative.

In eclampsia there is a greatly increased blood-pressure, and fits are always preceded by a still further rise in pressure. Many have pointed out that when and if the blood-pressure is kept low, fits do not occur. Though this is now a well-established fact, its pathogeny is obscure. The mechanism by which the poisonous substances in the blood produce fits is still unknown. The toxins are certainly hypertensive, but hypertension alone does not engender fits, as Dr Mirto has shown, by artificially increasing the blood-pressure in pregnant rabbits and dogs by the injection of adrenalin, with or without ligature of one or both ureters.

But in addition to hypertension and vascular constriction there is general capillary hyperaemia. Not only does the facial congestion, the engorged veins of the surface, betoken the presence of these conditions, but, as observed by Lubarsch multiple haemorrhages are to be found in every part of the body: the liver, kidneys, stomach and intestines, endocardium, lungs, etc., and in the pia mater and cortex. Schmorl also found/

found punctiform haemorrhage of meninges and cortex, and moreover of the central ganglia. Similar lesions, as to the cortex, were noted by Leusden, who also observed many ruptured capillaries, the blood flowing in the surrounding tissues, forming clots. Massen found the veins of various regions completely thrombosed, and also "considerable dilatation of the cerebral capillaries," the blood having been forced into them, doubtless by the constricted arteries.

We thus have ample testimony to the effect that the cortex is violently congested. This hyperaemia renders the nervous system abnormally excitable, and I think one may fairly claim that, if it does not assist in the production of fits, it at least increases the liability to them.

Now veratrum viride by depressing the vaso-motor centre induces relaxation of all the arteries of the body and causes accumulation of the blood in the large blood-vessels, or as Wood expresses it, the patient can be bled into her own vessels. In this way the blood is withdrawn from the capillaries and the cerebral capillary hyperaemia is diminished, thus decreasing the liability to convulsions.

It was in the United States of America that veratrum viride was first applied to the treatment of eclampsia, and among American obstetricians the drug has always possessed a large number of enthusiastic advocates./

advocates. As early as 1862 Dr Baker of Alabama had written in the Lancet that veratrum viride was evidently the most appropriate and useful remedy against puerperal convulsions.

From this time onward there were many who wrote in favour of the drug and some considered it a specific.

Papers were published by many older writers, but more recently by Cotret, De Wet, Reamy, Mann, Edgar, Norris, Hirst, Mangiagalli and others.

Some excellent statistics have been published. Thus, Pavin collected 284 cases with the remarkably low death-rate of 8 per cent.

Professor Mangiagalli of Milan read a paper on the treatment of eclampsia by means of veratrum viride at the 1908 meeting of the British Medical Association. From April 1897 to the end of 1907 he had had 100 cases of eclampsia under his care. In each case he had employed veratrum viride. Of his 100 cases, three were moribund on admission and died within two hours: three on admission had already cerebral haemorrhage and subsequently died. In the other 94 cases there were 6 deaths, giving a mortality of about 6.34%. But then in three of these cases the fits were completely stopped, and death occurred several days after the complete cessation of the fits - in one case from sepsis, in two from pneumonia.

But taking the whole 100 cases into account, the mortality was 12 per cent. In the ten years immediately/

immediately preceding, when no veratrum viride was employed, the death-rate was 23.68%.

In the conduct of his cases Mangiagalli sought to keep the pulse-rate below 80 beats per minute, and the blood-pressure below 150 mm. He holds that as long as the pressure is high, as long as the pulse is full, strong and tense it is necessary to continue the administration of the remedy. He therefore considers that small and repeated doses are to be preferred to large ones given at long intervals, and that, if one adheres to such a rule, all inconvenience - especially the vomiting - mentioned in some observations are sure to be avoided.

He points out that when the pulse is rapid and small, and the arterial-pressure but slightly elevated veratrum viride should not be used.

Norris holds the same views:- "The class of cases for which I have found this drug most useful is that with a full, quick, high-tension pulse, where consciousness returns in the intervals between convulsions, and where the accumulated toxins evidently have not overwhelmed the patient. When the pulse is feeble and rapid, the patient profoundly toxic and irresponsive to the usual treatment I have never seen any benefit from veratrum; indeed such cases require stimulation of the circulation rather than depression".

He gives 8 minims of the fluid extract and repeats the dose as required to keep the pulse between 70 and/

and 80 per min. A half to one drachm may be given in divided doses in 24 hours with safety.

Cotret injects 20 drops of the tincture, and repeats the same quantity in 30 minutes if the pulse is not reduced.

E. P. Davis injects 40 minims (U.S.P. 1905) every hour until the pulse falls below 90 and its tension is decidedly lessened.

Hirst, who gives 60 to 80 drops (U.S.P. 1905) as the initial dose, has seen it reduce the pulse to 60 in a few minutes.

Lapthorn Smith obtained subsidence of the blood-tension with 20 to 25 minims after other familiar remedies and even blood-letting had failed.

Notwithstanding the fact that so many favourable reports have been published and that the remedy was so popular among a large number of the American obstetricians, the drug has never won much favour in this country as a means of treatment in the disease of eclampsia. From time to time some obstetricians have used it, and a few still do, but the majority abandoned its use. There is probably more than one reason why it fell into disfavour.

The only available preparation was the tincture. The percentages of the alkaloids present in different samples varies very considerably, thus one cannot always rely upon the effect which will be produced.

Furthermore, when administered hypodermically, it gives/

gives rise to much local inflammation from its irritating action. As the patient is, more often than not, comatose, it is not possible to exhibit it by the mouth unless the stomach-tube be used. But even when given by the latter means absorption is doubtful and the effect is obtained after a very much longer interval than when the hypodermic route is employed.

Recently, however, Messrs Parke Davis & Co. introduced a preparation of the essential alkaloids contained in veratrum viride, under the name of "veratrone". It is made up in ½ and 1 c.c. sterilized ampoules, and "is an aseptic, non-alcoholic solution of the active principles of veratrum viride specially prepared for hypodermic use. It is standardised to a definite degree of activity by physiological tests. It contains a small proportion of chloretone, which acts as a preservative and which, by reason of its analgesic power, renders the process of injection almost painless". One c.c. is said to represent 4 gr. of veratrum viride or 20 m. of Tr. Veratri Viridis (B.P., 1885), and the dose advised by Parke Davis & Co. is: "hypodermically, from 0.6 to 1 c.c. (10 to 15 m.); orally from 1 to 2 c.c. (15 to 30 m.), repeated at short intervals until the desired effect is obtained."

Dr Haultain in a short paper read before the Edinburgh Obstetrical Society on July 9th, 1913 drew the attention of the fellows of the society to the drug and to the possibilities which it offered in the treatment/

treatment of eclampsia.

He reported seven cases. Four of these were in primiparae and all recovered. The other three were in multiparae, and of these two recovered, while one died, though in her case the fits had ceased after the administration of the veratrone.

In all cases there was marked dimunition in blood-pressure and pulse-rate following the hypodermic injection of 1 c.c. veratrone. The average fall in blood-pressure was found to be from about 160 to 105 mm. of mercury, this maximum effect being reached from 40 minutes to one hour after injection. At the same time the pulse rate fell to about 60 and in two cases to 54 per minute. In every case the fits were inhibited as long as the vascular tension remained low. In three out of the seven cases fits recurred some hours after the first dose and it was found that the blood-pressure had in the interval again risen. After a repetition of the veratrone the pressure fell as before and there were no more fits. Haultain therefore advises that the patient should be carefully watched in order that whenever the blood-pressure is seen to rise again, the drug may be again administered. In the cases under review no other form of treatment was employed other than the hot-pack to induce sweating and washing out the stomach, and at the same time leaving in 4 to 6 oz. of Epsom Salts.

One cannot but be impressed by the results obtained/

obtained in this series of cases, even though their number be small.

Dr Jardine of Glasgow had some years ago been in the custom of treating his cases of eclampsia with veratrum viride, but had ceased to employ the drug on account of the variability in strength of the tincture and of the consequent unreliability of the results. He was, however, so struck by the results obtained by Dr Haultain with veratrone and by the consistency in action of the drug that he decided to try it with the cases of eclampsia admitted into his wards in the Glasgow Royal Maternity and Women's Hospital.

During the past winter from 1st October, 1913 to 5th April, 1914 I had the privilege of being resident house surgeon in that hospital. During my term of office there were admitted into the wards 42 cases of eclampsia, and of these 20 were treated with veratrone, while 22 received other methods of treatment.

Through the kindness of my chiefs, Professor Murdoch Cameron and Dr Jardine, Professor Munro Kerr and Dr Russell, I am at liberty to make use of the notes I took upon these cases. During the month after I left the hospital there were 7 more cases treated with veratrone, and for permission to use the hospital notes on these I am indebted to Dr Jardine.

I have therefore a series of 49 cases of eclampsia, of which 27 were treated with veratrone, while 22 received other treatments such as morphia.

In/

In all cases the eliminative treatment was held to be the most important and was carried out regardless of the special treatment employed for controlling the fits.

The method employed in the Glasgow Maternity Hospital for stimulating the action of the emunctory organs is as follows:- On admission, after a rapid cleansing during which she is exposed as little as possible, the patient is placed on one of the special beds in the labour ward. A description of these beds has already been given. She is well covered over with warm blankets and surrounded by hot tins. The lower bowel is in all cases washed out with enemata of soap and water.

If the patient is comatose, the stomach is washed out till the wash-water returns clear, and 2 to 4 oz. Mag. Sulph. or 60 gr. Pulv. Jalap Co. is left in.

If the patient is conscious or only semi-comatose and can be made to drink, the salts can be given without the aid of the stomach-tube and gastric lavage is therefore sometimes omitted. In cases, however, where treatment was left entirely to my own judgment I latterly always made a point of washing out the stomach because, as a rule, I found considerable quantities of undigested food lying in it and undergoing fermentation.

As a general rule the patient is given two pints of saline under the breasts or into the tissues of the lax abdominal wall, if the patient has been already delivered./

delivered. The fluid used is normal saline with the addition of sodium acetate in one drachm doses to the pint.

Venesection is rarely carried out, unless the patient is of a very plethoric type and is very cyanosed. Where veratrone is given, it is not necessary, and may be dangerous on account of too great a diminution in the blood-pressure.

As soon as the patient can be made to drink, she is given as much "Potus Imperialis" and distilled water as she can take. No milk or other fluid food is given until the convulsions have quite ceased and the excretory organs are all working satisfactorily.

In the short notes of cases which follow I have not always mentioned the administration of enemata and purgatives, as it is a routine treatment. I have however noted where saline infusions were given, as all cases did not receive them.

As mentioned above the obstetric treatment was always expectant until the second stage of labour was reached, when delivery was assisted by forceps or other suitable method.

TWENTY-SEVEN CASES OF ECLAMPSIA TREATED WITH "VERATRONE".

I.

Primipara, aet 26. Fits commenced soon after onset of labour at full time. Seven fits before admission to hospital at 1 p.m. Patient comatose. Urine scanty - abundant albumen and some bile. Enema. Stomach washed out and Mag. Sulph. $\frac{3}{\dot{\dot{1}}\bar{1}}$ left in. Subcutaneous saline $\bar{0}\ \frac{}{\dot{\dot{1}}\bar{1}}$ under the breasts. Five fits between 1 p.m. and 3 p.m. Pulse 120; B.P. 150.

3.5 p.m. $\frac{1}{2}$ c.c. Veratrone hypodermically.

3.20 p.m. Pulse 104 B.P. 130

3.35 p.m. Pulse 72 B.P. 118

4.5 p.m. Pulse 62 B.P. 115.

No further fits and live child born spontaneously at 5.15 p.m.

At 6 p.m. Pulse 92; B.P. 130, but bowels had already moved, urine had been passed and patient regained consciousness. Continued to make good progress and had an uninterrupted recovery.

II.

Primipara, aet. 23 admitted at 8th month of pregnancy in labour. Semi-comatose - had already had 3 fits. A 4th fit immediately after admission. Enema. Salts by mouth. Veratrone $\frac{1}{2}$ c.c. In $\frac{1}{4}$ hour pulse rate/

rate fell from 106 to 48, and blood-pressure from 152 to 110. At end of ½ hour pulse 48; B.P. 105.

One fit immediately after the injection of the veratrone but none subsequently and patient was perfectly conscious 11 hours later. Macerated foetus born spontaneously two days later.

III.

Primipara, aet . 22. After premonitory symptoms lasting 3 weeks commenced taking convulsions. She was then about full time. Admitted to hospital after 6th fit in a comatose condition. Labour had just begun. Urine - abundant albumen, and a trace of blood and bile. Two fits within an hour of admission. Then given veratrone.

1 c.c. at	10.15 a.m.	Pulse 132	B.P. 165.
	10.30 a.m.	Pulse 96	B.P. 120
	10.45 a.m.	Pulse 72	B.P. 105
	11.45 a.m.	Pulse 68	B.P. 110

No further fits but patient vomited freely for two hours after veratrone.

Live child delivered by forceps the following afternoon. Rapid recovery.

IV.

Primipara, aet. 18. Death. Said to have been well until morning of admission (March 28th). Then complained of severe headache. Fit at 10 a.m. Numerous fits/

fits all day and never regained consciousness. Premature child (8 months) born alive at 6.30 p.m. Fits continued, 4 between delivery and admission to hospital at 10 p.m. Deeply comatose. Urine almost solid with albumen, no blood nor bile. Stomach and bowel washed out. Subcutaneous saline $\bar{0}$ $\dot{\bar{1}}\dot{\bar{1}}$. Three fits in first three-quarters of an hour after admission. Given veratrone $\frac{1}{2}$ c.c.

At 10.45 p.m. after 3rd fit. Pulse 128: B.P.128
11 p.m. Pulse 60 B.P.105
11.15 p.m Pulse 72 B.P. 88.

No more fits. Bowels and kidneys soon began to act well. Next day did not regain consciousness, but no more fits and emunctory organs all acting well. Rectal salines.

On 31st still comatose - subcutaneous saline $\bar{0}$ $\dot{\bar{1}}\dot{\bar{1}}$. Rectal salines being continued four hourly. Patient never regained consciousness, gradual wasting and temperature rose steadily each day to 106.2 at death on April 2nd at noon, i.e. $5\frac{1}{2}$ days after admission - no fits during that time. Death probably due to cerebral haemorrhage - but no localising symptoms - no paralysis; pupils both dilated, left a little more than the right. P.M. not obtained.

V.

Primipara, aet. 20. Delivered at full time of healthy child. Soon after delivery eclamptic fit: two more before admission to hospital at 10.55 p.m. in a comatose condition. Urine contained only 1 gr. per oz. albumen. Stomach washed out and Mag. Sulph. along with Pot. Bromid. and Chloral $\overline{aa}$ gr. $\overline{XX}$ left in. Saline $\overline{O}$ $\overline{\overline{11}}$ under the breasts. Enema. Notwithstanding treatment fits continued - 6 in two hours.

1 cc.Veratrone then given at 1 a.m. pulse 132: B.P.145

1.15 a.m pulse 115: B.P.120

1.30 a.m pulse 78: B.P.100

1.45 a.m pulse 64: B.P. 98.

At 2 a.m. pulse 64 and rather weak: patient had been vomiting badly and appeared collapsed. Given strychnine gr. $\frac{1}{30}$ hypod. Improved rapidly. No more fits and patient soon regained consciousness, making excellent recovery.

VI.

Primipara, aet. 24 at commencement of labour (at full time) was seized with eclamptic convulsion. Admitted to hospital in a semi-comatose condition. Urine loaded with albumen. Given enema and salts. Veratrone 1 c.c. No more fits. But pulse fell from 120 to 60, became irregular and poor in quality therefore strychnine gr. $\frac{1}{60}$ given hypodermically. Child still-born. Mother had good convalescence.

VII.

$\dot{\overline{11}}$-para, aet. 27. In 37th week. Five fits before admission. Semi-comatose, no sign of commencing labour. Urine almost solid with albumen. Bowel washed out. Salts ʒ$\dot{\overline{11}}$, chloral gr $\overline{XX}$, Pot. bromid. gr $\overline{XXX}$ per oram. 1½ hours later - no fits but pressure high and patient's appearance suggested return of fits, therefore 1 c.c. veratrone given at 6.25 p.m.

6.25 p.m. pulse 104: B.P. 165

6.40 p.m. pulse 64: B.P. 118

6.55 p.m. pulse 54: B.P. 103

7.25 p.m. pulse 56: B.P. 106.

No more fits, quite conscious the following day but eyesight very dim until after birth of child 3 days after admission. Child though premature healthy.

VIII.

Primipara, aet. 18 came to hospital as full time labour was commencing. While in receiving room took an eclamptic fit. A second fit occurred before she could be removed to the labour ward. Veratrone 1 c.c. Pulse rate fell from 150 to 68 and B.P. from 154 to 96 in ¾ hour. No more fits, and consciousness returned an hour later. Spontaneous delivery after 9 hours but child dead-born.

IX.

$\dot{\overline{11}}$-para, aet. 26. In 38th week of pregnancy found lying unconscious on bedroom floor in her night-dress. Had been lying thus for at least 3 hours before discovered. Six more fits before admission to hospital. On arrival she was almost moribund, very cyanosed and acute oedema of the lungs was present. Venesection preformed and 20 oz. blood withdrawn. Poultices and dry-cupping to base of lungs. Six fits within $1\frac{1}{2}$ hours of admission. Then given veratrone $\frac{3}{4}$ c.c. Pulse fell from 136 to 80 in $\frac{1}{2}$ hour. No more fits but cyanosis and pulmonary oedema became more marked. Oxygen inhalation and strychnine. Died 6 hours after admission.

X.

$\overline{V}$-para, aet. 35. 8 months pregnant. Preeclamptic symptoms for 6 weeks before fits commenced. Admitted to hospital after 2nd fit. Deeply comatose: well-marked jaundice. Urine solid with albumen - large amount of bile and blood. 15 oz. blood withdrawn from median-basilic and then $\overline{0}$ $\dot{\overline{11}}$ saline infused. Omnopon gr. $\frac{1}{3}$ hypod. Only one more fit. Labour set in - premature macerated foetus born. Two hours after delivery another fit. Veratrone 1 c.c. No more fits but jaundice deepened rapidly and death occurred early the following morning. Almost complete suppression of urine - only 1 oz. obtained while in hospital.

XI.

Primipara, aet. 21. Labour set in at full time. At commencement of 2nd stage convulsions began - 3 before admission to hospital and one immediately after arrival. Twins: breech of 1st found to be at perineum, delivered by traction and suprapubic pressure under chloroform-ether anaesthesia: 2nd delivered in similar manner. Both children alive and did well. No more fits till 9 hours after delivery when four occurred within an hour. Veratrone 1 c.c. then administered. Pulse rate fell from 136 to 48 and B.P. from 138 to 90 in 30 minutes. Patient became extremely collapsed and looked almost moribund but soon recovered under strychnine gr $\frac{1}{30}$ hypod and subcutaneous saline $\bar{0}$ $\dot{\dot{1}}\dot{\dot{1}}$. There were no more fits and patient had a very satisfactory convalescence.

XII.

Primipara, aet. 25: $7\frac{1}{2}$ months pregnant. 5 fits before admission. Semi-comatose. Abundant albumen, traces of blood and bile in the urine. Gastric lavage and salts $\mathfrak{z}\dot{\dot{1}}\dot{\dot{1}}$, chloral gr. $\overline{XX}$ and Pot. bromid. gr.$\overline{XXX}$ left in. Subcutaneous saline $\bar{0}$ $\dot{\dot{1}}\dot{\dot{1}}$. Three fits shortly after admission and then none till the following morning when 2 occurred in rapid succession. Veratrone 1 c.c. given at 8 a.m. Pulse fell from 130 to 50 and B.P. from 156 to 110 in $\frac{1}{2}$ hour. No more fits. Pulse rate rose slowly to 88 at 5 p.m. and B.P. to 135 but did not advance beyond this. Patient recovered and left hospital undelivered but no foetal-heart was audible and no "life" felt.

XIII.

Primipara, aet. 22. On admission had already had four fits. She was in labour and as os was fully dilated forceps were applied under chloroform-ether anaesthesia. Live, mature child, At 8 p.m. i.e. 2½ hours after delivery she had another fit. At 10.45 p.m. a 2nd fit - morphine gr.¼ hypod. By 2 a.m. the following morning had had two more fits - morphine gr. $\frac{1}{6}$. No more fits till 5.30 a.m. but between that hour and mid-day 5 convulsions occurred. At mid-day ½ c.c. veratrone - 5 min. later another fit: a second ½ c.c. veratrone. Within ½ hour patient became rather collapsed, pulse which had been 144 per min. becoming almost imperceptible. Rapid improvement followed subcutaneous injection of strychnine gr.$\frac{1}{30}$. No more fits and patient made good recovery.

XIV.

Primipara, aet. 18. A few days from full time seized with eclamptic convulsions. Admitted three hours after the first fit. Had already had 5 fits, and was in a semi-comatose condition. Abundant albumen. Veratrone 1 c.c. on admission. Pulse rate fell from 84 to 60. Labour set in and patient took 8 more fits in rapid succession. Forceps applied as soon as os fully dilated and live child delivered 7 hours after admission. Allowed to bleed from uterus. Subcutaneous saline ʒ ℥ℓ. Stomach washed out and salts ʒ ℥ℓ left in. No fits after delivery. Rapid recovery.

XV.

$\overline{\dot{V}\dot{I}}$-para, aet. 32. Normal delivery followed by headache and vomiting. Slight albuminuria. On 4th day of puerperium convulsions started. Before admission to hospital had had 3 fits. Comatose. Veratrone 1 c.c. Pulse fell from 100 to 76 in $\frac{1}{2}$ hour. Subcutaneous saline $\overline{0}$ $\overline{\dot{1}\dot{1}}$. No other treatment except enemata and salts. No fits after veratrone. Uneventful recovery.

XVI.

$\overline{\dot{X}\dot{I}\dot{I}\dot{I}}$-para, aet. 42: 7 months pregnant. Admitted in a semi-comatose condition having already had 4 fits. Urine contained abundant albumen and traces of both blood and bile. Morphine gr. $\frac{1}{4}$ hypod. Fits continued so given veratrone 1 c.c. Pulse rate fell from 110 to 65 in $\frac{1}{2}$ hour. No more fits. Ten days later premature labour set in and live child was born. It was however very weakly and died on 6th day. Albuminuria and occasional headaches continued till after delivery and then rapidly disappeared.

XVII.

$\overline{X}$-para, aet. 41: 6 months pregnant. Two fits before admission. Semi-comatose. Abundant albumen, some blood, no bile. Not in labour. Veratrone 1 c.c. Pulse fell from 110 to 60 within an hour. No more fits. Excellent convalescence. Was able to leave hospital a fortnight later with only a trace of albumen. She was undelivered: foetal heart not audible but patient said she still felt life.

XVIII.

$\dot{\text{I}}\dot{\text{I}}$-para, aet. 31. Post-partum eclampsia after first child. Preeclamptic symptoms for three weeks before first fit which occurred at 9 p.m. on day before admission. Admitted at 1.30 a.m., having already had 5 fits. She was semi-comatose and labour was just beginning. Urine solid with albumen, traces of blood and bile. Another fit within a few minutes of admission. Veratrone $\frac{1}{2}$ c.c. then administered. Pulse rate fell from 130 to 86 in $\frac{3}{4}$ hour. B.P. not noted. Between 3 a.m. and 4 a.m. 3 more fits occurred, but none after that hour. Spontaneous delivery of still-born mature child at 9.20 a.m. Next day extremely restless and required hyoscine gr. $\frac{1}{100}$. Did not regain complete consciousness till 3rd day of puerperium, thereafter progress satisfactory.

XIX.

Primipara, aet. 32 developed fits 3 weeks from full-time. After 3 fits 1 c.c. veratrone given about 6 a.m. A 4th fit immediately after injection. Pulse fell from 120 to 86 and B.P. from 165 to 118 in 20 minutes. No more fits until 3 p.m. when one occurred. Os then found to be fully dilated - forceps applied and live child delivered: a second, presenting transversely, delivered by version - still-born. Following day quite conscious but jaundiced and urine still highly albuminous and vulva which had been very oedematous began to slough. That afternoon another fit occurred. Veratrone/

Veratrone ½ c.c. and subcutaneous saline $\overline{O}$ $\dot{\overline{II}}$ given under the breasts. No more fits but jaundice deepened. Septic infection from vulva and death on 3rd day of puerperium.

XX.

$\dot{\overline{IV}}$-para, aet. 29: 5½ months pregnant. Ten fits before admission at 10.15 a.m. Comatose, not in labour. Stomach washed out and Mag. Sulph. ℥ $\dot{\overline{II}}$ left in. Subcutaneous saline $\overline{O}$ $\dot{\overline{II}}$. Treatment had no effect and 8 fits had occurred by 1.20 p.m. when ½ c.c. veratrone given.

1.20 p.m.	Pulse 144:	B.P. 115
1.35 p.m.	Pulse 136:	B.P. 88
1.50 p.m.	Pulse 136:	B.P. 80

No more fits until 11 p.m: another at midnight. Veratrone ½ c.c. repeated as pressure had risen to 120 once more. Pulse rate fell from 144 to 108 in 40 minutes. But in early morning 4 more fits occurred. She was free from them during the day but had one more at 8 p.m. By this time emunctory organs acting well and no further treatment beyond purgatives and mild diuretics given. Patient made excellent recovery and left hospital undelivered. It was however doubtful whether foetus was still living.

XXI.

Primipara, aet. 43. Previous history of nephritis. Preeclamptic symptoms commenced in 7th month of pregnancy. Fits developed a month later. Admitted after 2nd fit in a comatose condition. Urine almost solid with albumen. Veratrone ½ c.c. Pulse fell from 88 to 56 in ½ hour. No more fits. Labour set in the same evening and still-born premature child born by the breech the following morning. Satisfactory recovery.

XXII.

Primipara, aet. 22. Admitted in labour. She had already had 3 fits. Veratrone ½ c.c. and 2 pints saline under the breasts. An hour later os fully dilated and live premature child delivered by forceps. No fits after veratrone. Rapid recovery.

XXIII.

Primipara, aet. 20. Developed fits a few days before full time. At least 6 before admission. Comatose. Urine loaded with albumen: trace of blood. Another fit shortly after admission at 3.15 p.m. Veratrone ½ c.c. Pulse fell from 112 to 76. No more fits till 7 p.m. but between that hour and 9 p.m. 3 occurred. Another ½ c.c. veratrone given and 2 pints saline subcutaneously. No more fits till 5.30 a.m. the following morning. Veratrone ½ c.c. given a third time. No more fits. At 4.20 p.m. that afternoon live child delivered with forceps. Satisfactory puerperium.

XXIV.

Primipara, aet. 22. First fit a few days before full time. Had had several before admission to hospital at 3.40 p.m. She was not in labour and was comatose. Subcutaneous saline 2 pints. Stomach washed out and Mag. Sulph. $\overline{3}\,\dot{\overline{IV}}$ left in. Fits however continued and patient had six before 5 p.m. when veratrone $\frac{1}{2}$ c.c. given. Pulse rate fell from 150 to 130 in $\frac{1}{2}$ hour. No more fits until 10.30 p.m. Labour had set in and patient had 3 fits in rapid succession. A second dose of veratrone ($\frac{1}{2}$ c.c) was given and no more fits occurred. By 11.30 p.m. os was fully dilated and breech presented with legs extended. Still-born child delivered at 12.5 a.m. Patient had an uneventful recovery.

XXV.

Primipara, aet. 23. Admitted in a comatose condition at 9.30 p.m. She had had 2 fits and within the first hour in hospital had two more. She was then given veratrone $\frac{1}{2}$ c.c. and subcutaneous saline $\overline{0}\,\dot{\overline{I}}$. Stomach washed out and 4 oz. Mag. Sulph. left in. Between 5.15 a.m. and 7 a.m. the following morning patient had 3 more fits: veratrone ($\frac{1}{2}$ c.c) then repeated. Pulse fell from 70 to 36 and became rather poor in quality, but after subcutaneous injection of strychnine gr.$\frac{1}{60}$ soon improved. No more fits and following day a live 8 months child was born.

XXVI.

Primipara, aet. 24. Fits developed in 8th month of pregnancy. Admitted in a comatose condition. Urine almost solid with albumen. Chloral and Pot. Bromid. $\overline{aa}$ gr. $\overline{XX}$ and omnopon gr. $\frac{1}{3}$ were tried in turn but fits continued. After the 4th fit $\frac{1}{2}$ c.c. veratrone given and pulse fell from 98 to 65 within 30 minutes. There were no more fits and patient made a satisfactory recovery. Pregnancy not interfered with.

XXVII.

Primipara, aet. 39. Nephritis 2 years ago. Now 7 months pregnant. During whole of pregnancy headaches and vomiting: oedema of legs and face for at least a week. Admitted in a comatose condition having already had 3 fits. Urine showed abundant albumen and a trace of blood. There was no foetal heart audible. It was decided to induce labour and two bougies were inserted shortly after admission. There was no other treatment beyond enemata and purgatives. One fit seven hours after admission, then given $\frac{1}{2}$ c.c. veratrone. Pulse rate fell from 76 to 56 in $\frac{1}{2}$ hour. There were no more fits and patient delivered herself of a premature macerated foetus the following afternoon. Satisfactory recovery.

As in Dr Haultain's series one cannot but be struck with the rapidity and certainty with which the pulse rate and blood-pressure were diminished after the subcutaneous injection of the drug. As early as 5 to 10 minutes after injection quite a marked diminution in pressure is already noticeable. The maximum effect is on an average obtained in ½ hour, and is never delayed longer than an hour.

The degree to which the blood-pressure falls averages 40 to 50 mm. of mercury: e.g. 150 to 115 in Case I; 152 to 105 in Case II; 165 to 105 in Case III; 128 to 88 in Case IV, etc.

The pulse-rate as a rule falls to about 60, though in some cases it fell below 50: e.g. Cases II, XI, and XXV.

This corresponds almost exactly to the findings of Dr Haultain, which I have quoted above, the only difference being that he gives 40 minutes as the average time which elapses after injection until the maximum effect on the blood-pressure is noted, whereas as a rule I found it to occur as early as within ½ hour with very few exceptions.

Similar results as regards pulse-rate and blood-pressure were obtained when the drug was administered to healthy people. The following are the details of four cases in which veratrone was administered to healthy people:-

Case A. Veratrone 1 c.c. hypodermically at 8.30 p.m.

8.30 p.m.	Pulse	70	Blood-pressure	132
8.40 p.m.	"	68	"	120
8.45 p.m.	"	54	"	106
9.0 p.m.	"	52	"	82
9.15 p.m.	"	44	"	86
9.30 p.m.	"	52	"	85
11.0 p.m.	'	56	"	110

At 9 p.m. i.e. $\frac{1}{2}$ hour after injection the patient began to feel sick and at 9.30 she vomited.

Retching and vomiting continued for more than an hour, and did not cease until morphine gr.$\frac{1}{6}$ had been given hypodermically. There was also profuse diaphoresis. The vomiting was the only untoward symptom, the pulse even when as low as 44 remained regular and of very good quality. There was never any sign of collapse.

Vomiting was frequently noted after administration of veratrone in eclampsia, but it is difficult in these cases to say whether the vomiting is due to the drug or to the eclampsia.

Case B. $\frac{1}{2}$ c.c. veratrone hypod. at 8.10 p.m.

8.10 p.m.	Pulse	70	Blood-pressure	132
8.25 p.m.	"	68	"	115
8.40 p.m.	"	60	"	104
8.55 p.m.	"	60	"	98
9.10 p.m.	"	60	"	98

Again/

Again well-marked diaphoresis occurred. The patient felt rather squeemish ½ hour after the injection, but there was no vomiting and the squeemishness soon passed off.

Case C. ½ c.c. veratrone hypod. at 9.45 a.m.

9.45	a.m.	Pulse	85	Blood-pressure	138
10.0	a.m.	"	68	"	112
10.15	a.m.	"	56	"	99
10.45	a.m.	"	56	"	99
11.0	a.m.	"	60	"	102

Case D. ½ c.c. veratrone hypod. at 2.5 p.m.

2.5	p.m.	Pulse	90	Blood-pressure	124
2.20	p.m.	"	72	"	95
2.35	p.m.	"	66	"	90
2.50	p.m.	"	64	"	92
3.5	p.m.	"	64	"	92

In healthy subjects also the time required to obtain the maximum effect of the drug is 30 to 45 minutes. In the first case where 1 c.c. was administered, the fall in pressure amounted to 50 mm: in the others where only ½ c.c. was given the fall in pressure was about 35 mm.

In the cases of eclampsia which received veratrone, accompanying the fall in pulse-rate and blood-pressure cessation of the fits occurred in all cases except one viz. Case XIV. This case was not under my care and unfortunately there is no mention in the notes of the blood-pressure, nor of how soon after the administrat-

ion/

administration of the veratrone the fits recurred. The probability is that the pressure had risen again before the fits recommenced and veratrone should have been repeated. If this is the case, however, the pressure must have risen again very rapidly, for as a rule it was found to remain low for at least 3 hours.

The fact that the effect of veratrone is only temporary must be remembered, and the patient should be carefully watched for the return of high pressure. Should this occur the dose may be at once repeated. Examples of the necessity for repetition of the drug are found in Cases XIX, XX, XXIII, XXIV and XXV. In these cases fits recurred some hours after the first administration of the drug and the effect of the first dose had passed off.

The usual dose given was 1 c.c., and that as a rule was found to be a suitable amount. The effect of the drug lasts longer when 1 c.c. is given than when only $\frac{1}{2}$ c.c. is given. Of the cases in which recurrence of the fits took place after previous administration of veratrone, all except one viz. XIX received only $\frac{1}{2}$ c.c. as the initial dose. It is possible that if a larger dose had been given at the outset, fits would not have occurred in some of these cases, and repetition of the drug would then have been unnecessary. But dosage should be regulated according to the quality of the pulse and the amount of the blood-pressure./

blood-pressure. Just as all observers stated with regard to veratrum viride, when the pulse is full, quick and of high tension large doses can be given with safety. When the blood-pressure is about 160 mm. or more the full dose of 1 c.c. should be given: where, however, the blood-pressure is below 140 it is probably safer to commence with ½ c.c. in case the larger dose should be too depressant. If, after administration, this half dose is found to be insufficient and the pressure and pulse-rate are not reduced sufficiently, the drug may be repeated. The reason for this suggested caution is that though veratrone is apparently a perfectly safe drug, and on account of its careful standardisation very much safer than the ordinary Tr. Veratri Viridis, yet in four cases viz. V, VI, XI, and XIII the patient became somewhat collapsed with a very poor pulse within ¾ hour after receiving the veratrone. All four cases received a full dose of 1 c.c. In three of the cases (V, VI and XII) the patients had already been delivered, and it is possible that post-partum they are less able to stand the depressing action of the drug. All four patients rallied very rapidly after a hypodermic injection of strychnine.

The patient's pulse should always be watched carefully during the first half to one hour after administration in order that, should there by any sign of threatened collapse, suitable steps may at once be taken to counteract it. One must of course be guided by the quality/

quality of the pulse rather than by its rate, for the rate may fall very low and yet the pulse continue to be of good strength and quality and give one no cause for anxiety. Thus in case II the pulse-rate fell as low as 48 per minute and in case XII to 50, yet neither patient showed any sign of collapse.

The treatment advised in cases of overdose of veratrum viride has already been noted. Strychnine gr.$\frac{1}{30}$ hypodermically will probably be found to be all that is required, but should it fail other stimulants as whiskey or brandy by mouth or rectum, ammonia, digitalis etc. may be employed. If vomiting is severe morphine may be the only effectual treatment.

Veratrone, just as veratrum viride, is contra-indicated when the pulse is feeble, rapid and of low tension, and the patient is profoundly toxic. Such cases require the administration of stimulants as strychnine, digitalin, etc.

For purposes of comparison I shall also give short notes on the twenty-two cases of eclampsia which were admitted to the hospital during the same period but did not receive veratrone in their treatment.

TWENTY-TWO CASES OF ECLAMPSIA NOT TREATED WITH "VERATRONE."

1.

$\overline{IV}$-para, aet. 32. At 9 p.m. on Nov. 23rd - a few days before full time - seized with an eclamptic convulsion. Labour set in spontaneously but before birth of child at 7.30 a.m. on 24th patient had had 7 more fits. Birth was unassisted but child was still-born. Shortly after labour completed another fit occurred, so patient sent into hospital at 9 a.m. Was then in a semi-comatose condition, pulse 120 but soft (B.P. 115). Urine contained abundant albumen, blood and bile. Stomach and bowel washed out. Salts $\overline{\dot{3}\dot{i}\dot{i}}$. Two pints saline under the breasts. Three more fits, the last occurring at 12.45 p.m. Very restless all afternoon - given chloral and bromide $\overline{aa}$ gr. $\overline{XX}$. The following day quite conscious and made an excellent recovery.

2.

$\overline{\dot{V}\dot{I}}$-para, aet. 36. For 6 weeks severe headache and rapidly increasing dimness of vision. No oedema. On strict milk-diet, but on account of apparent improvement allowed fish and milk-pudding on Dec. 10th. At 11 p.m. the same day eclamptic fits began and before admission at 4.30 a.m. on 11th had had 3 fits. Semi-comatose. Not in labour (only 6 months pregnant). Abundant/

Abundant albumen; no blood nor bile. Treatment - gastric lavage, leaving in chloral and bromide $\overline{aa}$ gr $\overline{XX}$ and Mag. Sulph. ℥ $\dot{\overline{II}}$. Subcutaneous saline $\overline{O}$ $\dot{\overline{II}}$. Only one more fit, but very restless towards evening therefore morphine gr. $\frac{1}{4}$ hypod.

Following day conscious but almost blind. Intense albuminuric retinitis on ophthalmoscopic examination. On 13th labour pains set in and premature dead foetus born. Good recovery, regaining a fair degree of vision.

3.

Primipara, aet. 22: 6 months pregnant. 8 fits before admission to hospital. Semi-comatose, not in labour. Urine scanty and almost solid with albumen, but no blood nor bile. Stomach and bowel washed out. Salts ℥ $\dot{\overline{II}}$, chloral and bromide $\overline{aa}$ gr $\overline{XX}$ by mouth. Saline $\overline{O}$ $\dot{I}$ ℔ under the breasts. No more fits and made an excellent recovery. Foetal heart inaudible after first day and dead-born 6 months foetus born four days later.

4.

Primipara, aet. 16. Headaches for 3 months and oedema for a week but continued at work till morning of admission - 31st December. She rose as usual but headache much more severs so returned to bed and at 8.30 a.m. she had her first fit. Before admission to hospital at 1 p.m. she had had "numerous" fits - on/

on an average one every ¼ hour. She was quite comatose. Urine solid with albumen, traces of blood and bile. Pregnancy had advanced 8 months and labour had just set in. Gastric lavage - salts, chloral and bromide were left in. During the first three hours after admission there were 11 fits, although omnopon gr. ⅓ was administered twice. As there was almost complete suppression of urine, patient was placed in a hot pack and given subcutaneous saline $\bar{O}$ $\overline{II}$. There were no more actual fits but there was constant slight twitching. Progress of labour was slow and os was not fully dilated until 1 a.m. on 1st January when forceps were immediately applied. Child was dead-born. Patient never rallied. There was marked oedema of the lungs and she died - without further fits and without regaining consciousness - about mid-day on 1st January. Post-mortem showed focal necrosis of liver and cloudy swelling of both kidneys.

5.

Primipara, aet. 20. Admitted to hospital on 4th January at 11.15 p.m. on account of marked oedema and albuminuria. She was within a few days of full time. At once placed on preeclamptic treatment, but at 3.30 a.m. on 5th had a fit, and a second at 4.15 a.m. Regained consciousness soon after. No treatment beyond attention to emunctory organs. No more fits. Delivered of live mature child on 6th January at 2.30 a.m.

6.

Primipara, aet. 22. Preeclamptic symptoms for at least a week before first fit which occurred 1½ hours before admission to hospital on Jan. 5th. On arrival she was comatose, a 2nd fit having occurred just shortly before. Urine solid with albumen. Treatment adopted was morphine gr. ¼, repeated 2 hours later. Only 3 fits after admission and rapidly regained consciousness. Pregnancy continued until Jan. 18th when a 7 months macerated foetus was born. No foetal heart had been audible since the 8th. Albuminuria cleared up rapidly after delivery.

7.

Primipara, aet. 22. Labour set in at full time and during the first stage two fits occurred. She was therefore sent into hospital. A third fit shortly after admission and as head was already on the perineum forceps were applied and a live child delivered. Patient allowed to bleed from the uterus and 2 pints of saline were given under the breasts. No more fits but as patient continued to be very restless she was given chloral and bromide $\overline{aa}$ gr. $\overline{XX}$. Soon recovered consciousness and made good recovery.

8.

Primipara, aet. 18. 1½ hours after a normal labour was seized with eclamptic fit. Given salts, chloral and bromide, but as fits continued subctuaneous saline/

saline $\overline{0}\ \overline{11}$ was administered and omnopon gr. $\frac{1}{3}$ hypod. In all she had 8 fits, but for almost 24 hours after that remained semi-comatose and was very noisy and restless. Omnopon repeated: hyoscine gr. $\frac{1}{100}$. Finally made good recovery.

9.

Primipara, aet. 34. 7 weeks from term was brought to hospital with history of eclamptic fit having occurred $1\frac{1}{4}$ hours previously. Shortly after admission a 2nd fit occurred. Stomach and bowel washed out. Morphine gr. $\frac{1}{3}$ hypod. There was only one more fit. Patient made good recovery and pregnancy continued until 5 days later when premature labour set in. Child was alive but died on 10th day.

10.

Primipara, aet. 20. In the 11 hours before admission to hospital patient had had at least 13 fits. Comatose. Urine scanty and almost solid with albumen but contained no blood nor bile. Two more fits occurred before she could be removed to the labour ward. They were of a very severe type. Stomach and bowel washed out. Morphine gr. $\frac{1}{3}$ hypod. Patient had only 2 more fits. Two days later labour set in. Child which was mature, was dead-born - no foetal-heart had been audible the day after admission.

11.

Primipara, aet. 26 was delivered of twins on Feb. 9th at 10 p.m. The following day complained of severe headache and at 5.45 p.m. was seized with an eclamptic fit. Removed to hospital where she arrived at 8.30 p.m. in a semi-comatose condition. Urine contained surprisingly little albumen and was not greatly diminished in quantity. Salts ℥ $\dot{\dot{\text{II}}}$, Pot. bromid. gr. $\overline{\text{XX}}$. She had only 2 more fits that day, but the following morning i.e. 11th, four occurred within an hour. Gastric lavage, subcutaneous saline $\bar{\text{O}}$ $\dot{\dot{\text{II}}}$, morphine gr. ¼ hypod. There was no recurrence of fits and patient made a good recovery.

12.

Primipara, aet. 36. 7 months pregnant. 6 fits before admission to hospital. Patient of a very plethoric type, comatose. Shortly after admission another very severe fit occurred. Urine almost solid with albumen and contained also blood and bile. Venesection - 10 oz. withdrawn: 2 pints of saline were then given intravenously. Gastric lavage. Salts ℥ $\dot{\dot{\text{II}}}$, chloral and bromide $\overline{\text{aa}}$ gr $\overline{\text{XX}}$. There were no more fits and patient made a very rapid recovery. Premature macerated foetus born a fortnight later.

13.

Primipara, aet. 23. 8 months pregnant. Preeclamptic symptoms for at least a fortnight. During the 8 hours before her admission to hospital 10 fits had occurred. Comatose. Only 1 oz. urine obtained by catheter - loaded with albumen, no blood nor bile. Shortly after admission 5 more fits occurred. Stomach and bowel washed out. Morphine gr $\frac{1}{3}$ hypod. No more fits but patient remained deeply comatose and very cyanosed, dying $2\frac{1}{2}$ hours after admission to hospital.

14.

Primipara, aet. 23. Admitted to hospital on Feb. 28th with history of having had one eclamptic fit the previous evening at 7 p.m., none since. She was conscious but somewhat dazed. The urine contained abundant albumen, also traces of blood and bile. Preeclamptic symptoms had been noticeable for a month before admission. She was 4 weeks from full time. No treatment was given beyond attention to bowels and dieting. There were no more fits but urine continued loaded with albumen until after delivery which occurred on March 26th. The child was living up till onset of labour but foetal heart ceased before the cervix was half-dilated.

15.

Primipara, aet. 19. During first stage of labour was seized with convulsions. 5 occurred before her admission to hospital. Comatose. Abundant albumen. Saline $\overline{O}$ $\dot{\overline{11}}$ subcutaneously. No more fits and $2\frac{1}{2}$ hours later os was fully dilated, forceps were applied and a live mature child delivered. Patient made good recovery.

16.

Primipara, aet. 26. Eclampsia commenced when pregnancy had advanced almost to full time. On admission patient was comatose, having already had at least 12 fits. Urine scanty, solid with albumen; large quantity of bile but no blood. Treatment adopted beyond the washing out of stomach and bowel and administration of salts, was morphine gr. $\frac{1}{3}$ hypod. There were no more fits. Labour commenced soon after admission but advanced very slowly. The following afternoon she was still undelivered, forceps were applied and a live child delivered. Patient did not regain complete consciousness until 3rd day of puerperium. Sloughing of the vagina occurred and a streptococcal infection set in. Death took place 18 days after delivery.

(In this case there is no doubt that labour should have been terminated earlier. The foetal head had been lying too long in the vagina, and its pressure on the poorly-resistant eclamptic tissues caused sloughing.

The/

The patient had recovered from the eclampsia and the urine was free from albumen within a week after delivery. Death was due to a streptococcal infection.)

17.

$\dot{\overline{\text{VIII}}}$-para, aet. 36, had eclampsia in her 7th pregnancy. In this pregnancy remained well except for slight headaches during the last week. Labour came on at full time and presented on difficulty. After delivery complained of very severe headache all day, and 14 hours after the birth the first fit occurred. During the next 12 hours she had 6 fits. She was then sent to hospital but did not arrive until 3 hours after the last fit. She was in a semi-comatose condition. Urine contained abundant albumen. No treatment was given beyond the usual attention to the emunctory organs. There were no more fits and consciousness was rapidly regained. Well the following day.

18.

Primipara, aet. 25. Fits commenced during first stage of labour. Several before admission. Morphine gr. $\frac{1}{4}$, followed by gr. $\frac{1}{2}$ an hour later as fits were not checked. Hot pack. Fits continued, so stomach washed out and Mag. Sulph. $\dot{\overline{\text{II}}}$ and Pot. bromid. gr. $\overline{\text{XXX}}$ left in. Eight hours after admission os fully dilated and live child delivered with forceps. Patient allowed to bleed from the uterus and 2 pints of saline given under the breasts. No further fits until the afternoon/

afternoon of the following day when two occurred in rapid succession. Morphine gr. $\frac{1}{4}$ hypod. along with digitalin gr. $\frac{1}{100}$. No more fits, patient regained consciousness next day and made good recovery.

19.

Primipara, aet. 26. Labour set in at full time. Two hours after commencement of pains an eclamptic fit. Admitted to hospital after the third fit in a comatose condition. Abundant albumen, but no blood nor bile. Morphine gr. $\frac{1}{4}$ hypod. Venesection 20 oz. followed by saline infusion of $1\frac{1}{2}$ pints. Gastric lavage, salts $\overline{3ii}$ left in. During the course of the day patient had 3 fits. Os fully dilated 8 hours after admission and live child delivered with forceps. No fits after delivery. Excellent recovery.

20.

Primipara, aet. 20. Admitted to hospital at full time as labour commencing. There was considerable oedema and albuminuria. Labour proceeded normally but as head was on the perineum an eclamptic fit occurred. Forceps at once applied and labour terminated but child was dead-born. No further treatment. No more fits and patient made rapid recovery.

21.

Primipara, aet. 24. Shortly after onset of labour at full time the first fit occurred. Admitted to hospital an hour later. Venesection 20 oz., followed by saline infusion $\overline{O}$ $\dot{\dot{\overline{II}}}$. Stomach washed out and salts $\overline{\dot{\dot{\overline{II}}}}$, Pot. Bromid. gr. $\overline{XX}$, Chloral gr. $\overline{XV}$ left in. As 4 more fits occurred, the cervix was dilated and bipolar version performed. The labour terminated an hour later, but the child was still-born. No more fits. Convalescence delayed by pleurisy, but ultimate result good.

22.

$\dot{\dot{\dot{\overline{III}}}}$-para, aet. 40. Preeclamptic symptoms appeared in the 6th month. At the end of the 7th month fits commenced, and 3 had occurred before admission to hospital. Patient comatose and very cyanosed. One oz. urine obtained by catheter, solid with albumen, some blood but no bile.

Venesection $\overline{\overline{XV}}$, followed by saline infusion of 2 pints. Gastric lavage, salts $\overline{II}$, chloral and bromide $\overline{aa}$ gr. $\overline{XX}$ left in. She had 3 more fits, then appeared to be progressing favourably but 6 hours after admission she suddenly became very cyanosed, collapsed and died.

Of the 27 cases treated with veratrone four died, giving a mortality of 14.8%: whereas of the 22 which did not receive veratrone four also died, giving a mortality of 18.18%.

This shows apparently little difference in results but it must be pointed out that the majority of those cases which did not receive veratrone were of a much milder type, and in several in which the drug was employed other treatments had first been tried and found to be unavailing. Again in case IV death was not really due to eclampsia but probably to cerebral haemorrhage. There were no fits for 5½ days before death, and all emunctory organs were acting well. Case $\overline{IX}$ was moribund on admission. In all the fatal cases there were no fits after veratrone, thus the drug had really acted as required, for, after all, it is only with the view of controlling the fits that it is given. No one could hold the view that it is a true antidote to the eclamptic toxins. Its value is as an agent for controlling the fits and so, by conserving the patient's strength, allowing one time to proceed with the eliminative treatment, which at the present time is still the most satisfactory and surest way of overcoming the eclamptic toxins, and to delay delivery until it can be effected by operations of slight importance, such as the use of the forceps in the second stage.

C O N C L U S I O N S.

Even though the number of cases that I have been able to report is small, yet even from them, especially when taken in conjunction with those reported by Dr Haultain, I think we can fairly conclude that in veratrone we have a drug which may be of the greatest value in the treatment of eclampsia.

Our knowledge of the pathology and etiology of the disease is so small that treatment must still be carried out to a large extent along symptomatic lines.

Now if the convulsive fit is but a symptom, it is one of the most violent and dangerous, not only because it represents the gravity of the poison, but also in itself, as the repetition of the fits is the cause of very serious circulatory trouble, constituting a serious source of danger to the life of the patient. In addition to circulatory complications e.g. cerebral haemorrhage we have the exhaustion directly due to the fits, and the pulmonary complications which may be indirectly due to them.

We must consider as precious, therefore, any means which allows this most dangerous manifestation to be controlled and allows us to gain time to employ the necessary eliminative treatment and enables us to tide the patient over to such time as spontaneous delivery takes place, or until conditions are more favourable for artificial delivery by operations of minor importance./

importance.

That veratrone can and does control the fits is shown well in the cases reported. In what manner this is effected I am not prepared to say unless one accepts the theory that the fits are due, in part at least, to cerebral hyperaemia. The drug overcomes this hyperaemia "by bleeding the patient into her own vessels".

It is certainly the case that so long as the blood-pressure and pulse-rate remain low, the fits do not return.

But in addition to its effect on the vasomotor centre and vascular system, veratrone is also a spinal sedative and produces diaphoresis. Both of these effects are valuable in eclampsia.

The initial dose should be $\frac{1}{2}$ to 1 c.c. hypodermically according to the condition of the patient's pulse and blood-pressure. With a full, quick pulse whose tension is about 160 mm. or more, one may safely give 1 c.c.: if, however, the pressure is not so high - 140 mm. or lower - it is safer to begin with a $\frac{1}{2}$ c.c., and the dose may be repeated if it is found to be insufficient.

As the action of the drug does not last on an average more than about 3 hours, the patient's pulse should be carefully watched for signs of rise in pressure, and if necessary the drug should be again administered. One should aim at keeping the blood-pressure/

blood-pressure below 120 and the pulse-rate below 80.

Veratrone cannot be called a dangerous drug, yet its use requires care, and for the first hour the patient should be kept under supervision in case of any tendency to collapse. In post-partum cases special care should be employed. Should the pulse begin to be poor in quality, strychnine gr $\frac{1}{60}$ to $\frac{1}{30}$ hypod. should at once be given. It is not the rate of the pulse but rather its quality which should concern one, for the pulse may fall below 50 per minute without the patient showing any signs of collapse.

When the pulse from the start is rapid and small and the arterial pressure low, veratrone is contra-indicated.

Veratrone is not an antidote to the eclamptic poison, for, even though the fits cease under its use, the other signs of eclampsia remain. One must not therefore trust to it alone, and it is very important that the "eliminative" treatment should not be neglected, but rather receive the greatest attention, for at the present time it is still the most satisfactory and surest way of overcoming the eclamptic toxins. The real value of the drug is that by controlling the fits and so conserving the patient's strength it gives one time to proceed with the eliminative treatment and enables one to employ the expectant obstetric treatment, so saving the patient from the great shock and danger of rapid and forcible delivery.

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